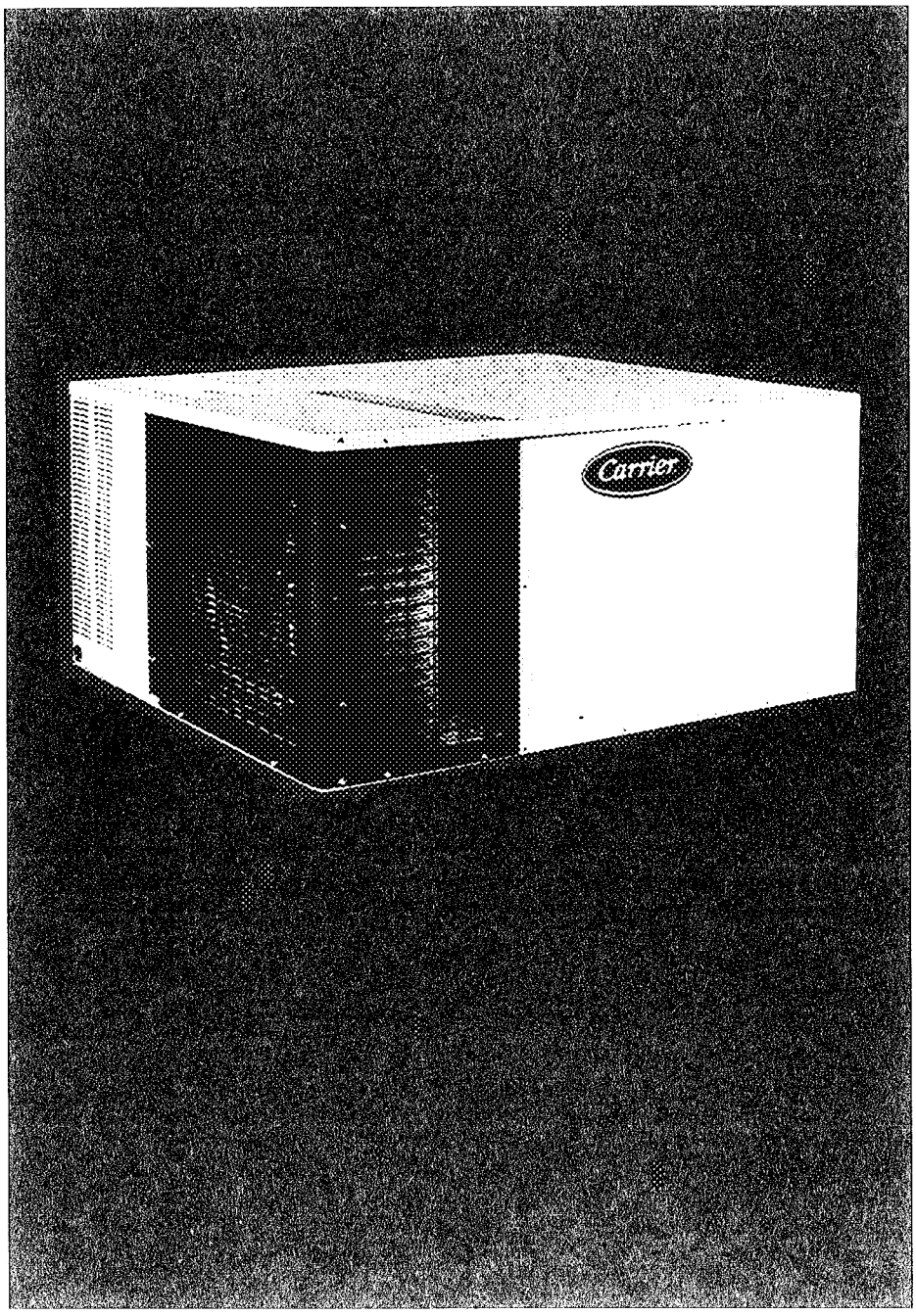
Carrier®

Product Data

48SS Single-Package Gas Heating/Electric Cooling Units

1-1/2 to 5 Nominal Tons

COMMERCIAL UNITARY SYSTEMS



Single-Package Rooftop Products with Energy-Saving Features

- direct spark ignition
- low sound levels
- 81% AFUE on most units
- 10 SEER

Features/Benefits

One-piece heating and cooling units with low installation costs, dependable performance, and easy maintenance

Easy installation

Factory-assembled package is a compact, fully self-contained, combination gas heating/electric cooling unit that is prewired, prepiped, and precharged for minimum installation expense

These 48SS units are available in a variety of standard and optional heating/cooling size combinations with voltage options to meet residential and light commercial requirements. Units are lightweight and install easily on a rooftop or a ground-level pad

Convertible duct configuration

Unit is designed for easy use in either downflow or horizontal applications

Efficient operation

High-efficiency design with SEERs (Seasonal Energy Efficiency Ratios) of 10.0 and AFUE (Annual Fuel Utilization Efficiency) ratings as high as 81 0% All units have a minimum CSE (California Seasonal Efficiency) rating of 76%

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Energy-saving, direct-spark ignition saves gas by operating only when the room thermostat calls for heating. Standard units are furnished with natural gas controls. A low-cost, field-installed kit for propane conversion is available for all units

Model 48SS units meet the California maximum oxides of nitrogen (NO_x) emission requirements

Durable, dependable components

Compressors are designed for high efficiency Each compressor is hermetically sealed against contamination to help promote longer life and dependable operation. Each compressor also has vibration isolation to provide quiet operation All compressors have internal high-pressure and overcurrent protection Rotary compressors are standard on unit size 018 Reciprocating compressors are standard on unit sizes 024-042. Scroll compressors are standard on unit sizes 048 and 060

Monoport inshot burners produce precise air-to-gas mixture which provides for clean and efficient combustion The large monoport on the inshot (or injection type) burners seldom, if ever, needs cleaning All gas furnace components are accessible in one compartment

Turbo-tubular™ heat exchangers are constructed of aluminized steel for corrosion resistance and optimum heat transfer for improved efficiency The tubular design permits hot gases to make multiple passes across the path of the supply air In addition, dimples located on the heat exchanger walls force the hot gases to stay in close contact with the walls, improving heat transfer.

Direct-drive multispeed, PSC (permanent split capacitor) blower motor is standard on all models.

Direct-drive, PSC condenser-fan motors are designed to help reduce energy consumption and provide for cooling operation down to 40 F outdoor temperature

Refrigerant system is designed to provide dependability Liquid refrigerant strainers are used to promote clean, unrestricted operation. Each unit leaves the factory with a full refrigerant charge. Refrigerant service connections make checking operating pressures easier.

Evaporator and condenser coils are computer-designed for optimum heat transfer and cooling efficiency Condenser coil is fabricated of copper tube and aluminum fins and is located inside the unit for protection against damage for long life and reliable operation The condenser coil is internally mounted and protected by a composite grille. Copper fin coils are also available from the factory by special order. These coils are recommended in applications where aluminum fins are likely to be damaged due to corrosion and are ideal for seacoast applications

Low sound ratings ensure a quiet indoor and outdoor environment with sound ratings as low as 7 4 bels

Easy to service cabinets provide easy accessibility to serviceable components during maintenance and installation Rounded corners are an important safety feature, and a high quality finish ensures an attractive appearance

Optional base rails provide holes for rigging and handling as well as an elevated mounting frame that provides structural support for horizontal installations.

Downflow option unit is converted for downflow at the factory to allow vertical ductwork connections Unit is equipped with base rail.

Low and high voltage electrical entries allow low and high voltage to be brought in through either the front duct panel or rear flue panel

Integrated gas control board provides safe and efficient control of heating and simplifies troubleshooting through its built-in diagnostic function

Weatherized cabinets are constructed of heavy-duty, phosphated, zinc-coated prepainted steel capable of withstanding 500 hours in salt spray Interior surfaces of the evaporator/heat exchanger compartment are insulated to help keep the conditioned air from being affected by the outdoor ambient temperature and to provide improved air quality. (Conforms to American Society of Heating, Refrigeration and Air Conditioning Engineers [ASHRAE] No. 62P) Sloped condensate pan permits an external drain

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Model number nomenclature

Carrier®

48SS 024 060 3 1 1 AA

Model No.

48SS — Single Package Gas Heating/ Electric Cooling

Nominal Cooling Capacity

018 — 1 1/2 Tons
024 — 2 Tons
030 — 2 1/2 Tons
036 — 3 Tons
042 — 3 1/2 Tons
048 — 4 Tons
060 — 5 Tons

Heat Level

040 — 40,000 Btuh
060 — 60,000 Btuh
080 — 80,000 Btuh
100 — 100,000 Btuh
120 — 120,000 Btuh
140 — 140,000 Btuh

V-Ph-Hz

3 — 208/230-1-60
5 — 208/230-3-60
6 — 460-3-60

Series

Packaging

Options

AA — Base Rail
AB — Downflow With Base Rail

ARI* capacities

COOLING CAPACITIES AND EFFICIENCIES

UNIT 48SS	NOMINAL TONS	STANDARD CFM	NET COOLING† CAPACITIES	SEER†	SOUND RATINGS** (Bels)
018040	1½	600	17,000	10 0	7.4
024040 024060	2	800	24,000	10 0	7 6
030040 030060 030080	2½	1000	29,200	10 0	8 0
036060 036080 036100 036120	3	1200	36,000	10 0	8 0
042060 042080 042100 042120	3½	1400	42,500	10 0	8 2
048080 048100 048120 048140	4	1600	47,000	10 0	8.2
060080 060100 060120 060140	5	1995	59,500	10 0	8 2

LEGEND

Bels — Sound Levels (1 bel = 10 decibels)
db — Dry Bulb
SEER — Seasonal Energy Efficiency Ratio
wb — Wet Bulb

*Air-Conditioning & Refrigeration Institute.
†Rated in accordance with U.S Government DOE (Department of Energy) test procedures and/or ARI Standard 210/240-89
**Rated in accordance with ARI Standard 270-84

NOTES:

1 Ratings are net values, reflecting the effects of circulating fan heat Ratings are based on.

Cooling Standard: 80 F db, 67 F wb indoor entering-air temperature and 95 F db outdoor entering-air temperature

2. Before purchasing this appliance, read important energy cost and efficiency information available from your retailer

OUTDOOR SOUND: ONE-THIRD OCTAVE BAND DATA — DECIBELS

MODEL NO.	48SS						
Frequency (Hz)	018	024	030	036	042	048	060
63	49 8	38 1	45 7	47 8	45 5	56.0	54 3
125	56 5	55 0	58.1	59 3	61.2	65 6	65 1
250	60 3	65 3	68.7	67.4	70 4	71 5	71 5
500	59 8	67 2	64 7	68 8	69 9	71 4	72 7
1000	64 1	68 9	73.0	73.1	76 5	74 2	73 9
2000	64 1	65 5	70.2	69.5	71.3	73.3	73.4
4000	65.2	63.8	68 8	68 2	73.7	69 6	71 7
8000	56.0	60 3	66 6	65 8	65.5	67 1	66.3

Bels — Sound Levels (1 bel = 10 decibels)

HEATING CAPACITIES AND EFFICIENCIES

UNIT 48SS	HEATING INPUT (Btuh)	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE RANGE (°F)	AFUE (%)	CSE (%)
018040	40,000	32,800	20-50	81	76 5
024040			20-50	81	76 5
030040			20-50	81	76 5
024060	60,000	48,600	25-55	81	77 5
030060			25-55	81	77 5
036060			25-55	81	77 5
042060			25-55	81	77 5
030080	80,000	64,800	40-70	81	77 5
036080			40-70	81	77 5
042080			40-70	81	77.5
048080			40-70	81	77 5
060080			40-70	81	77 5
036100	100,000	81,000	50-80	81	78 0
042100			50-80	81	78 0
048100			50-80	81	78 0
060100			50-80	81	78 0
036120	120,000	97,200	60-90	80	77 5
042120			60-90	80	77 5
048120			60-90	80	77 5
060120			60-90	80	77 5
048140	140,000	113,000	50-80	80	77 5
060140			50-80	80	77 5

LEGEND

AFUE — Annual Fuel Utilization Efficiency
CSE — California Seasonal Efficiency

NOTE: Before purchasing this appliance, read important energy cost and efficiency information available from your retailer

Carrier®

SERIES 311, 511, AND 611

UNIT SIZE 48SS	018040	024040	024060	030040	030060	030080	036060	036080	036100	036120
NOMINAL CAPACITY (ton)	1½	2	2	2½	2½	2½	3	3	3	3
OPERATING WEIGHT (lb)										
Without Base Rail	272	303	315	320	324	324	336	336	348	348
With Optional Base Rail	296	327	339	344	356	356	360	360	372	372
COMPRESSORS	Rotary	Reciprocating								
Quantity	1	1								
REFRIGERANT (R-22)										
Charge (lb)	2 60	2 75	2 75	3 40	3 40	3 40	4 30	4 30	4 30	4.30
REFRIGERANT METERING DEVICE	Acutrol™ Device									
Orifice ID (in.)	030	030	030	030	030	030	.032	032	032	032
CONDENSER COIL										
Rows...Fins/in	1. 17	1. 17	1. 17	2 17	2. .17	2. .17	2. .17	2. .17	2. 17	2. .17
Face Area (sq ft)	5 95	5 95	5 95	5 95	5 95	5 95	5 95	5 95	5 95	5 95
CONDENSER FAN										
Nominal Cfm	1700	1700	1700	1900	1900	1900	1900	1900	1900	1900
Diameter (in.)	18	18	18	18	18	18	18	18	18	18
Motor Hp (Rpm)	⅛ (850)	⅛ (850)	⅛ (850)	⅛ (850)	⅛ (850)	⅛ (850)	¼ (1050)	¼ (1050)	¼ (1050)	¼ (1050)
EVAPORATOR COIL										
Rows...Fins/in	3 15	3 .15	3 15	3 15	3 15	3 15	3 15	3 15	3 15	3 15
Face Area (sq ft)	1 83	2 29	2 29	2 29	2 29	2 29	3 06	3 06	3 06	3 06
EVAPORATOR FAN	Direct Drive									
Nominal Airflow (Cfm)	600	800	800	1000	1000	1000	1200	1200	1200	1200
Size (in)	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10
FURNACE SECTION*										
Burner Orifice No. (Qty. .drill size) Natural Gas	1 32	1 32	2 38	1 32	2 38	2 32	2 38	2 32	3 36	3 32
Burner Orifice No. (Qty...drill size) Propane Gas	1 41	1 41	2 46	1 41	2 46	2 42	2 46	2 42	3 44	3 42
RETURN-AIR FILTERS (in.)†										
Throwaway	20 x 20	20 x 20	20 x 20	20 x 24	20 x 24	20 x 24	20 x 24	20 x 24	20 x 24	20 x 24

UNIT SIZE 48SS	042060	042080	042100	042120	048080	048100	048120	048140	060080	060100	060120	060140
NOMINAL CAPACITY (ton)	3½	3½	3½	3½	4	4	4	4	5	5	5	5
OPERATING WEIGHT (lb)												
Without Base Rail	375	375	387	387	414	426	426	426	453	465	465	465
With Optional Base Rail	399	399	411	411	438	450	450	450	477	489	489	489
COMPRESSORS	Reciprocating				Hermetic Scroll							
Quantity	1				1							
REFRIGERANT (R-22)												
Charge (lb)	5 20	5 20	5 20	5 20	6 50	6 50	6 50	6 50	7 00	7 00	7 00	7 00
REFRIGERANT METERING DEVICE	Acutrol™ Device											
Orifice ID (in.)	034	034	034	034	030	030	030	030	030	030	030	030
CONDENSER COIL												
Rows.. Fins/in.	2. .17	2. 17	2. .17	2. .17	2. 17	2 17	2. 17	2. 17	2 17	2. 17	2. 17	2. 17
Face Area (sq ft)	7 04	7 04	7.04	7.04	8 67	8 67	8 67	8 67	8 67	8 67	8 67	8 67
CONDENSER FAN												
Nominal Cfm	1900	1900	1900	1900	2400	2400	2400	2400	2400	2400	2400	2400
Diameter (in.)	18	18	18	18	20	20	20	20	20	20	20	20
Motor Hp (Rpm)	¼ (1050)	¼ (1050)	¼ (1050)	¼ (1050)	⅓ (1050)	⅓ (1050)	⅓ (1050)	⅓ (1050)	⅓ (1050)	⅓ (1050)	⅓ (1050)	⅓ (1050)
EVAPORATOR COIL												
Rows...Fins/in	3 15	3 15	3 .15	3 15	3. 15	3. 15	3. 15	3. 15	4. 15	4. 15	4. 15	4. 15
Face Area (sq ft)	3 33	3 33	3 33	3 33	4 44	4 44	4 44	4 44	4 44	4 44	4 44	4 44
EVAPORATOR FAN	Direct Drive											
Nominal Airflow (Cfm)	1400	1400	1400	1400	1600	1600	1600	1600	1995	1995	1995	1995
Size (in.)	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10
FURNACE SECTION*												
Burner Orifice No. (Qty. drill size) Natural Gas	2 38	2 32	3 36	3 32	2 32	3 36	3 .32	3 30	2 32	3 36	3 32	3 30
Burner Orifice No. (Qty...drill size) Propane Gas	2 46	2 42	3 44	3 42	2 42	3 44	3 42	3 40	3 42	3 44	3 42	3 40
RETURN-AIR FILTERS (in.)†												
Throwaway	24 x 24	24 x 24	24 x 24	24 x 24	24 x 30	24 x 30	24 x 30	816**	24 x 30	24 x 30	24 x 30	960**

*Based on altitude of 0-2000 feet

†Required filter sizes shown are based on the larger of the ARI (Air Conditioning & Refrigeration Institute) rated cooling airflow or the heating airflow at a velocity of 300 ft/min for throwaway type or 450 ft/min for high-capacity type Air filter pressure drop for non-standard filters must not exceed 0 08 in wg

**Sq inch Filter is mounted external to unit

Options and accessories

Factory-installed options

Unit with base rail provides holes for rigging and handling as well as an elevated mounting frame that gives additional structural support for horizontal installations

Downflow option unit is shipped from factory configured for vertical ductwork connection Unit is equipped with base rail.

Field-installed accessories

Factory-assembled roof curbs are designed for use on downflow discharge applications Heavy gage, galvanized steel construction provides one-piece support The curb complies with the standards of the NRCA (National Roofing Contractors Association) A wood nailing strip is provided for attaching the roofing to the curb

Modulating economizers are available for downflow or horizontal discharge applications

The economizers adjust their outdoor- and return-air dampers to economically blend cooler outdoor air with warmer return air for comfort cooling. This process reduces energy costs and extends equipment life by allowing the use of outdoor air to supply "free" cooling when conditions are favorable

Modulating economizers have a mixed-air controller that provides for full-range modulation of the outdoor- and return-air dampers The enthalpy control selects the suitable outdoor-air quality for "free" cooling operation by measuring the outdoor-air dry bulb temperature and humidity mix Modulating economizers also have an adjustable, motor-mounted, minimum-position potentiometer and a compressor lockout switch The motor operates through the unit 24-v low-voltage control circuit.

Constant ventilation is recommended for light commercial application when the conditioned space is occupied

Manual outdoor-air damper provides for minimum outdoor air and is manually adjustable This device closes automatically whenever the evaporator fan is not operating

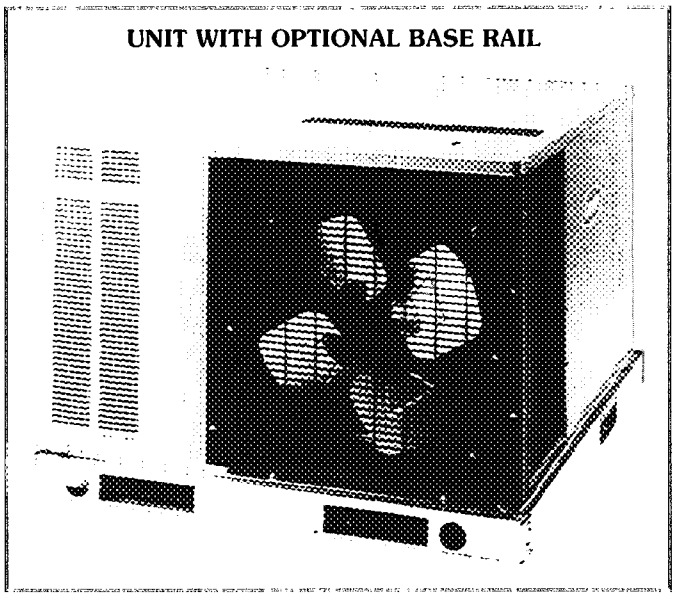
Two-position damper allows outside air to enter the building when the indoor fan is energized When enthalpy control detects that outside air is suitable for cooling, outdoor-air damper opens fully and indoor-air damper closes, allowing outside air to enter building

Thermostat and subbase provide heating and cooling unit control The subbase provides system and fan switching at the thermostat location

Carrier electronic programmable thermostats provide 2-stage heating and 2-stage cooling control with remote communication ability

Low-ambient kit (Motormaster® II device) allows the use of mechanical cooling down to outdoor ambient temperatures as low as 0° F

UNIT WITH OPTIONAL BASE RAIL



Solid-state Time Guard® device protects compressor by preventing short cycling.

Crankcase heater warms crankcase oil to reduce refrigerant migration and ensure proper compressor lubrication. (Recommended on 208/230-v single-phase units in sizes 024-042 only)

High- and low-pressure switches provide additional safety features and protect the unit from running at unsuitable pressures.

Filter rack features easy installation, serviceability, and high filtering performance

Lifting bracket kit provides attachment points for rigging straps The kit is not required when unit is equipped with an optional base rail or downflow application.

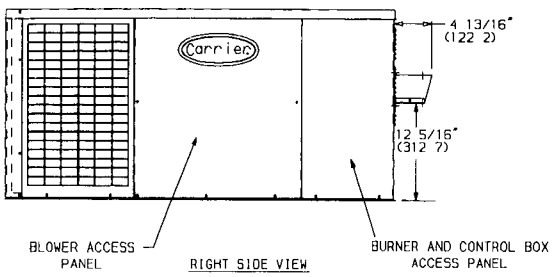
The natural-to-propane conversion kit allows for conversion from natural gas to liquid propane

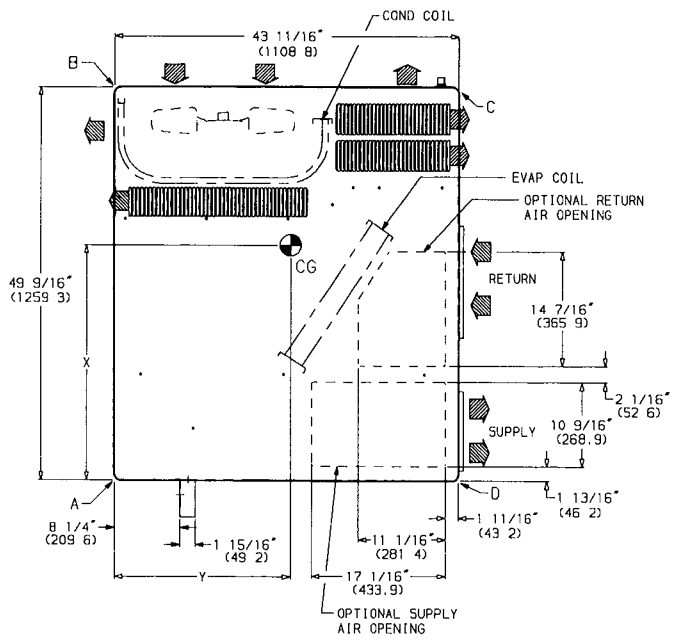
Flexible duct kit consists of 2 flexible UL-listed (Underwriters' Laboratories) ducts The duct construction includes vapor barrier and 1-in fiberglass insulation The 'K' factor is 0 23 Each duct has a square-to-round snap adapter for attachment to the accessory roof curb on one end, and a round clamp collar for attachment to the accessory concentric diffuser box on the other end

Concentric diffuser box is aerodynamically designed and equipped with a combination 4-way supply and center return diffuser The box is designed for use with accessory flexible ducts and roof curbs to provide an easily installed concentric system A special core is provided with the diffuser box to provide even 4-way air distribution.

Base unit dimensions

48SS018-042 WITHOUT BASE RAIL





REQ'D CLEARANCES FOR SERVICING in (mm)

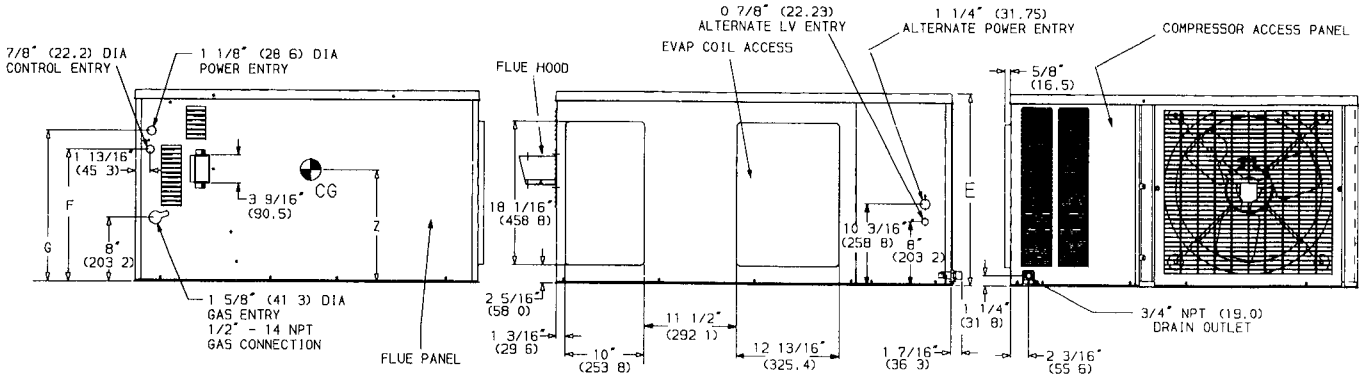
Duct panel	0
Unit top	36 (914)
Side opposite ducts	36 (914)
Compressor access (Except for NEC requirements)	36 (914)

REQ'D CLEARANCES TO COMBUSTIBLE MATL in (mm)

Maximum extension of overhangs	48 (1219)
Unit top	14 (356)
Duct side of unit	0
Side opposite ducts	9 (229)
Bottom of unit	0
Flue panel	30 (762)

NEC REQ'D CLEARANCES in (mm)

Between units, control box side	42 (1067)
Unit and ungrounded surfaces, control box side	36 (914)
Unit and block or concrete walls and other grounded surfaces, control box side	42 (1067)



UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CORNER WEIGHT (lb/kg)				UNIT HEIGHT (in /mm)
		lb	kg	A	B	C	D	E
48SS180040	208/230-1-60	272	123	81/37	62/28	76/35	53/24	24 1/613
48SS024040	208/230-1-60	303	138	97/44	43/20	123/56	40/18	24 1/613
48SS024060	208/230-1-60	315	143	100/45	46/21	126/57	43/20	24 1/613
48SS030040	208/230-1-60, 208/230-3-60	320	145	100/45	47/21	126/57	47/21	24 1/613
48SS030060/080	208/230-1-60, 208/230-3-60	324	147	94/43	63/29	115/52	52/24	24 1/613
48SS036060/080	208/230-1-60, 208/230-3-60, 460-3-60	336	153	86/39	76/35	111/50	63/29	24 1/613
48SS036100/120	208/230-1-60, 208/230-3-60, 460-3-60	348	158	89/40	79/36	114/52	66/30	24 1/613
48SS042060/080	208/230-1-60, 208/230-3-60, 460-3-60	375	170	95/43	86/39	119/54	75/34	28 1/714
48SS042100/120	208/230-1-60, 208/230-3-60, 460-3-60	387	176	98/45	89/40	122/55	78/35	28 1/714

UNIT	F in /mm	G in /mm	CENTER OF GRAVITY in /mm		
			X	Y	Z
48SS018040	16 9/16/420 7	18 15/16/481 0	25 07/637	20 59/523	10 85/276
48SS024040			27 07/688	23 35/593	
48SS024060			26 98/685	23 27/591	
48SS030040			26 71/678	23 46/596	
48SS030060/080			27 15/689	22 36/568	
48SS036060/080			27 50/698	22 48/571	
48SS036100/120			27 40/696	22 44/570	
48SS042060/080	20 9/16/522 3	22 15/16/582 6	27 01/686	22 44/570	12 7/321
48SS042100/120			26 94/684	22 44/570	

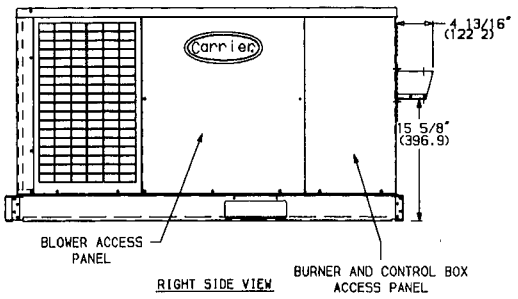
LEGEND

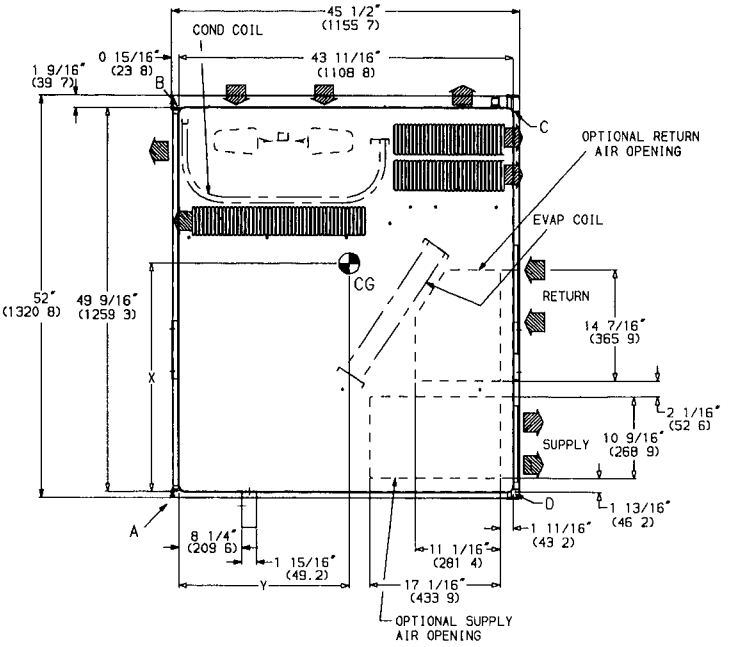
CG	— Center of Gravity	MAT'L	— Material
COND	— Condenser	NEC	— National Electrical Code
LV	— Low Voltage	REQ'D	— Required

NOTE: Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge

Base unit dimensions (cont)

48SS018-A042 WITH OPTIONAL BASE RAIL





REQ'D CLEARANCES FOR SERVICING in (mm)

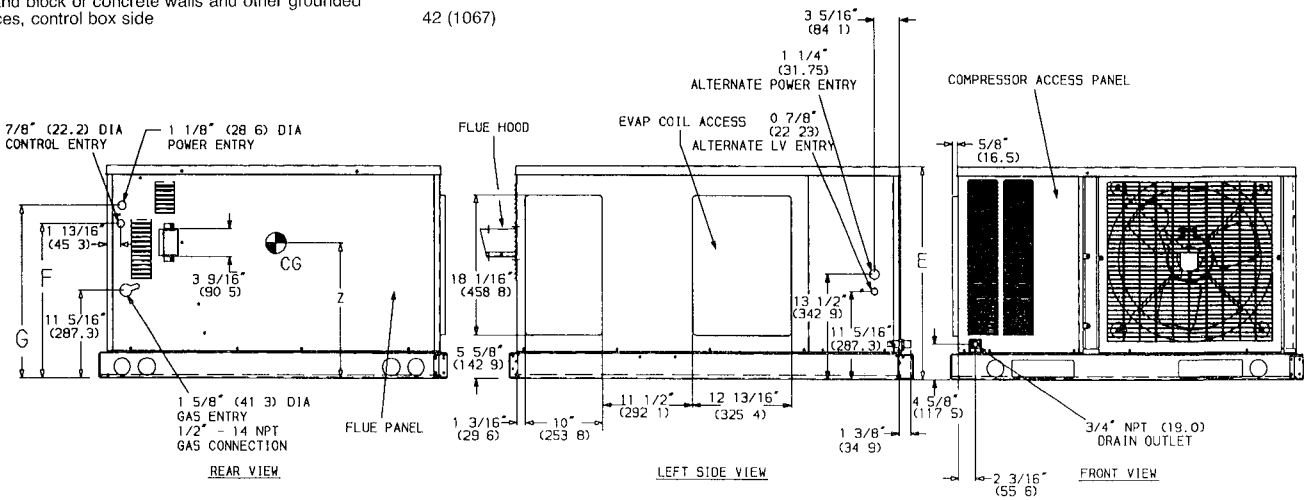
Duct panel	0
Unit top	36 (914)
Side opposite ducts	36 (914)
Compressor access (Except for NEC requirements)	36 (914)

REQ'D CLEARANCES TO COMBUSTIBLE MATL in (mm)

Maximum extension of overhangs	48 (1219)
Unit top	14 (356)
Duct side of unit	0
Side opposite ducts	9 (229)
Bottom of unit	0
Flue panel	30 (762)

NEC REQ'D CLEARANCES in (mm)

Between units, control box side	42 (1067)
Unit and ungrounded surfaces, control box side	36 (914)
Unit and block or concrete walls and other grounded surfaces, control box side	42 (1067)



UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CORNER WEIGHT (lb/kg)				UNIT HEIGHT (in./mm)
		lb	kg	A	B	C	D	E
48SS018040	208/230-1-60	296	135	87/40	68/31	82/37	59/27	27 4/697
48SS024040	208/230-1-60	327	149	103/47	49/22	129/59	46/21	27 4/697
48SS024060	208/230-1-60	339	155	106/48	52/24	132/60	49/22	27 4/697
48SS030040	208/230-1-60, 208/230-3-60	344	157	106/48	53/24	132/60	53/24	27 4/697
48SS030060/080	208/230-1-60, 208/230-3-60	356	162	102/46	71/32	123/56	60/27	27 4/697
48SS036060/080	208/230-1-60, 208/230-3-60, 460-3-60	360	164	92/42	82/37	117/53	69/31	27 4/697
48SS036100/120	208/230-1-60, 208/230-3-60, 460-3-60	372	169	95/43	85/39	120/55	72/33	27 4/697
48SS042060/080	208/230-1-60, 208/230-3-60, 460-3-60	399	181	101/46	92/42	125/57	81/37	31 4/798
48SS042100/120	208/230-1-60, 208/230-3-60, 460-3-60	411	187	104/47	95/43	128/58	84/38	31 4/798

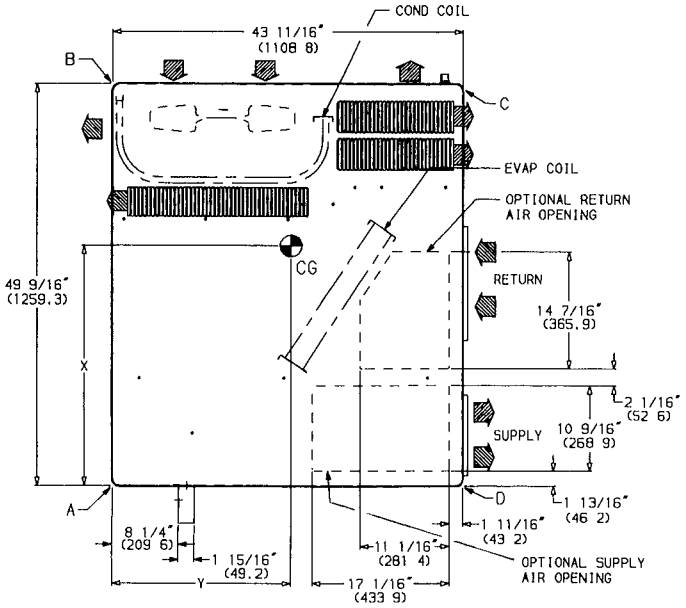
UNIT	F in /mm	G in /mm	CENTER OF GRAVITY in /mm		
			X	Y	Z
48SS018040			25 04/636	22 72/577	
48SS024040			26 90/683 3	20 17/512 3	
48SS024060			26 82/681 2	20 22/513 6	
48SS030040	19 13/16/504 8	22 1/4/565 4	26 57/674 9	20 1/ 509 3	13 16/334 3
48SS030060/080			26 93/684	21 1/535 4	
48SS036060/080			27 31/693 7	21 0/532 6	
48SS036100/120			27 23/691 6	21 0/533 1	
48SS042060/080	23 7/8/606 4	26 1/4/666 8	26 87/682 5	21 0/533 1	14 96/380
48SS042100/120			26 81/681	21 0/533 7	

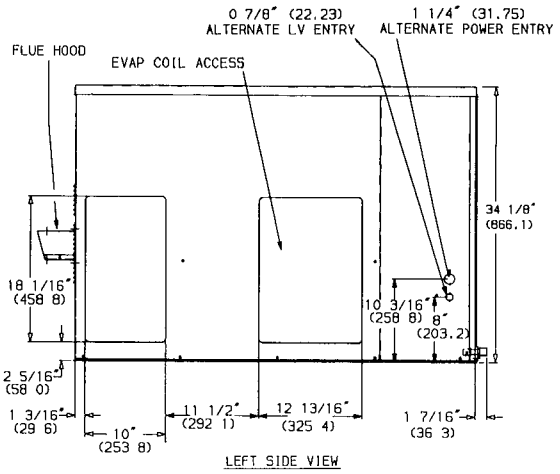
LEGEND

CG	—	Center of Gravity	MAT'L	—	Material
COND	—	Condenser	NEC	—	National Electrical Code
LV	—	Low Voltage	REQ'D	—	Required

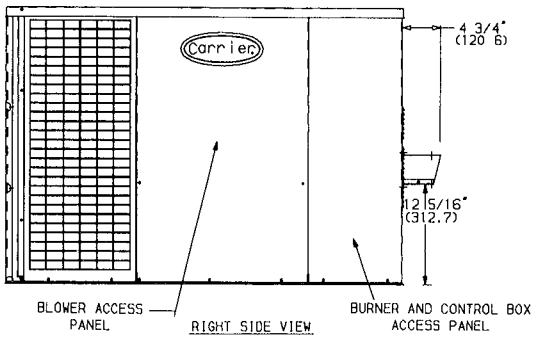
NOTE: Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge

48SS048,060 WITHOUT BASE RAIL

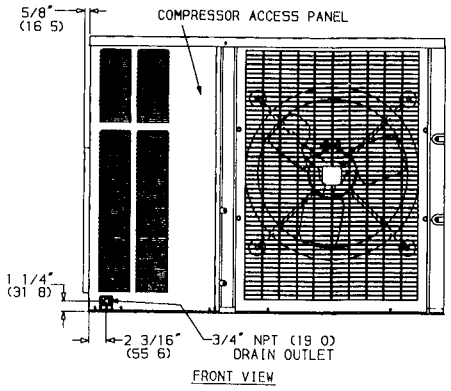




LEFT SIDE VIEW



RIGHT SIDE VIEW



FRONT VIEW

REQ'D CLEARANCES FOR SERVICING in (mm)

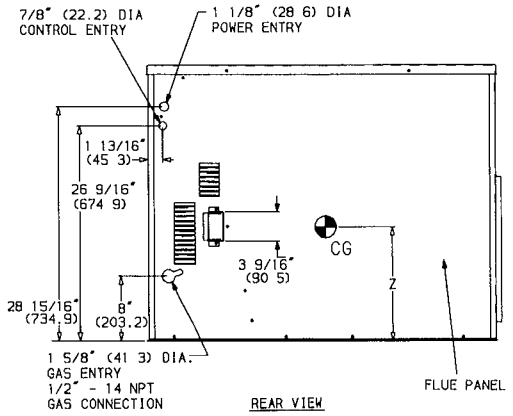
Duct panel	0
Unit top	36 (914)
Side opposite ducts	36 (914)
Compressor access (Except for NEC requirements)	36 (914)

REQ'D CLEARANCES TO COMBUSTIBLE MATL in (mm)

Maximum extension of overhangs	48 (1219)
Unit top	14 (356)
Duct side of unit	0
Side opposite ducts	9 (229)
Bottom of unit	0
Flue panel	30 (762)

NEC REQ'D CLEARANCES in (mm)

Between units, control box side	42 (1067)
Unit and ungrounded surfaces, control box side	36 (914)
Unit and block or concrete walls and other grounded surfaces, control box side	42 (1067)



REAR VIEW

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CORNER WEIGHT (lb/kg)			
		lb	kg	A	B	C	D
48SS048080	208/230-1-60, 208/230-3-60, 460-3-60	414	188	107/49	83/38	158/72	66/30
48SS048100/120/140	208/230-1-60, 208/230-3-60, 460-3-60	426	193	110/50	86/39	159/72	71/32
48SS060080	208/230-1-60, 208/230-3-60, 460-3-60	453	206	117/53	93/42	167/76	76/35
48SS060100/120/140	208/230-1-60, 208/230-3-60, 460-3-60	465	211	120/55	96/44	167/76	82/37

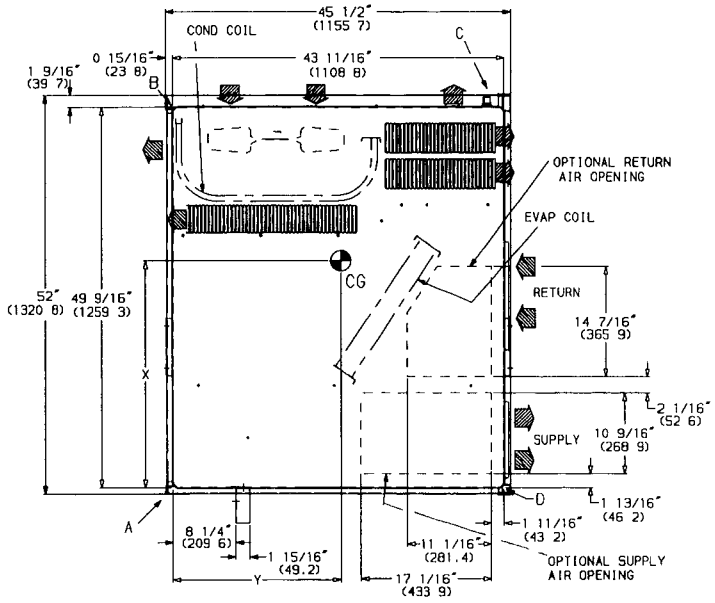
UNIT	CENTER OF GRAVITY (in./mm)		
	X	Y	Z
48SS048080	28.76/731	23.46/596	15.35/390
48SS048100/120/140	28.42/722	23.42/595	15.35/390
48SS060080	28.36/720	23.27/591	15.35/390
48SS060100/120/140	27.95/710	23.23/590	15.35/390

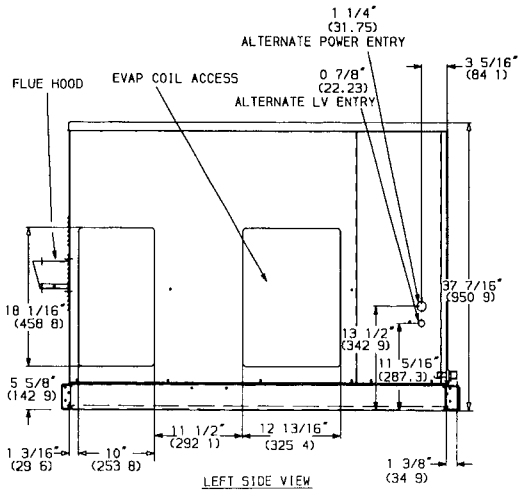
LEGEND

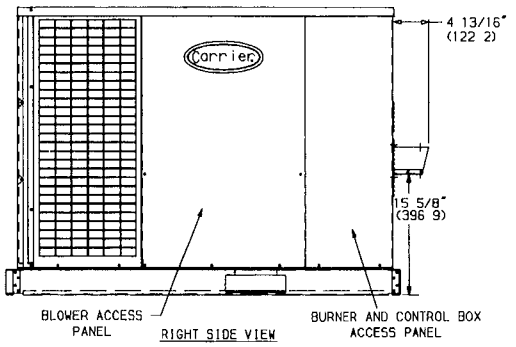
CG	— Center of Gravity	**MAT'L**	— Material
COND	— Condenser	**NEC**	— National Electrical Code
LV	— Low Voltage	**REQ'D**	— Required

NOTE: Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge

48SS048,060 WITH OPTIONAL BASE RAIL







REQ'D CLEARANCES FOR SERVICING in (mm)

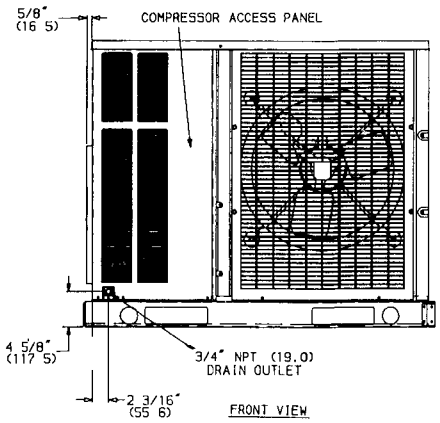
Duct panel	0
Unit top	36 (914)
Side opposite ducts	36 (914)
Compressor access	36 (914)
(Except for NEC requirements)	

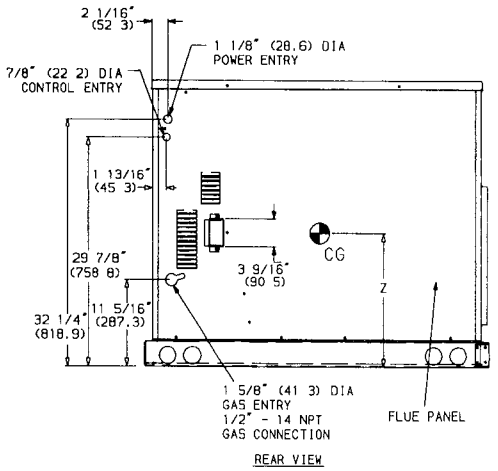
REQ'D CLEARANCES TO COMBUSTIBLE MATL in (mm)

Maximum extension of overhangs	48 (1219)
Unit top	14 (356)
Duct side of unit	0
Side opposite ducts	9 (229)
Bottom of unit	0
Flue panel	30 (762)

NEC REQ'D CLEARANCES in (mm)

Between units, control box side	42 (1067)
Unit and ungrounded surfaces, control box side	36 (914)
Unit and block or concrete walls and other grounded surfaces, control box side	42 (1067)





UNIT	ELECTRICAL CHARACTERISTICS	UNIT WEIGHT		CORNER WEIGHT (lb/kg)			
		lb	kg	A	B	C	D
48SS048080	208/230-1-60, 208/230-3-60, 460-3-60	438	199	113/51	89/40	164/75	72/33
48SS048100/120/140	208/230-1-60, 208/230-3-60, 460-3-60	450	205	116/53	92/42	165/75	77/35
48SS060080	208/230-1-60, 208/230-3-60, 460-3-60	477	217	123/56	99/45	173/79	82/37
48SS060100/120/140	208/230-1-60, 208/230-3-60, 460-3-60	489	222	126/57	102/46	173/79	88/40

UNIT	CENTER OF GRAVITY (in /mm)		
	X	Y	Z
48SS048080	28 54/724 9	20 00/508	17 66/448 6
48SS048100/120/140	28 22/716 8	20 05/509 3	17 66/448 6
48SS060080	28 18/715 6	20 19/512 8	17 66/448 6
48SS060100/120/140	27 79/705 9	20 23/513 8	17 66/448 6

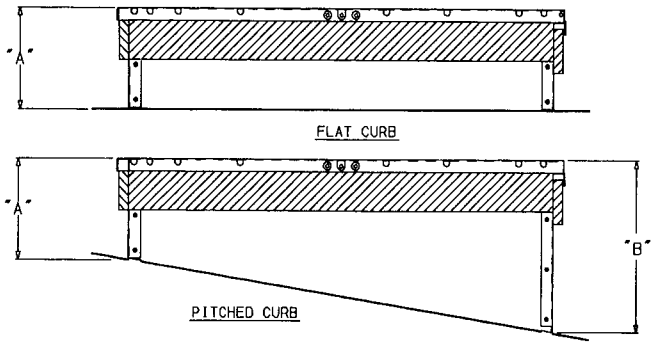
LEGEND

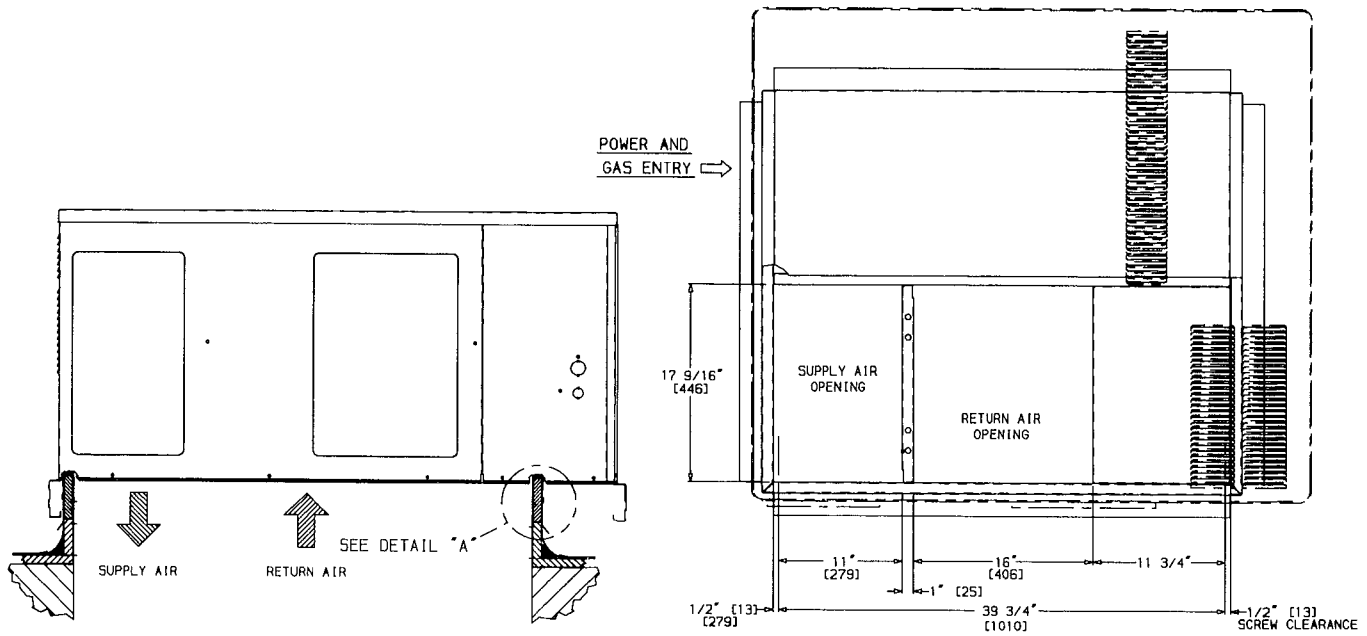
CG	– Center of Gravity	MAT'L	– Material
COND	– Condenser	NEC	– National Electrical Code
LV	– Low Voltage	REQ'D	– Required

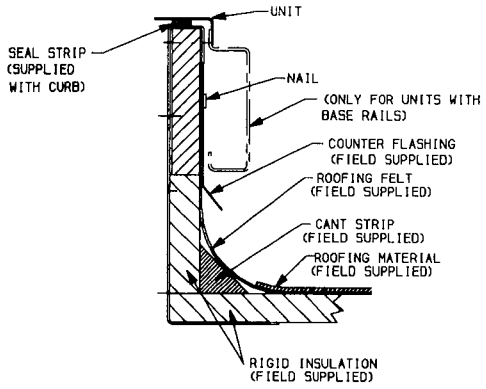
NOTE: Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge

ROOF CURB DIMENSIONS

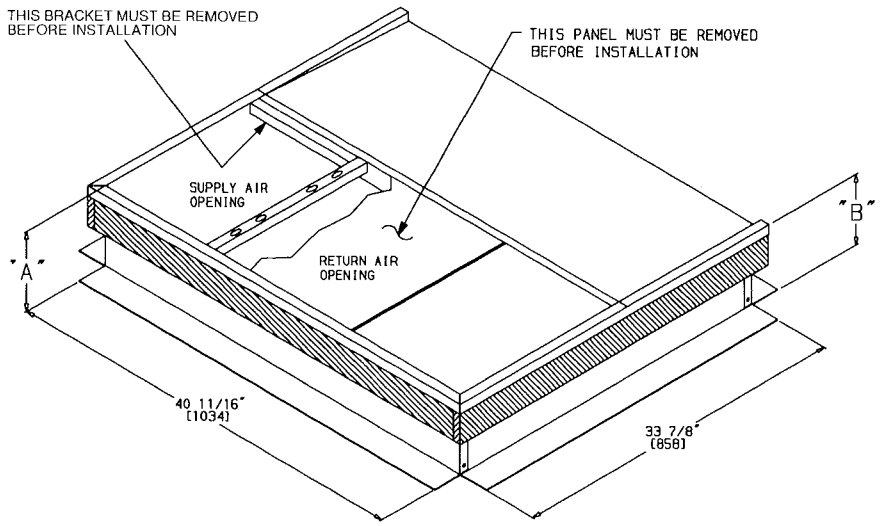
	PART NUMBER	"A"	"B"	PITCH
FLAT	50SS900015	8" [203]	—	—
	50SS900016	11" [279]	—	—
	50SS900017	14" [356]	—	—
PITCHED	50SS900019	8" [203]	10⅞" [276]	1.12
	50SS900020	8" [203]	13⁹⁄₁₆" [344]	2:12
	50SS900021	8" [203]	16⅜" [416]	3.12
	50SS900022	8" [203]	19¼" [489]	4:12
	50SS900023	8" [203]	22⅜" [568]	5 12
	50SS900024	8" [203]	25⅝" [651]	6:12







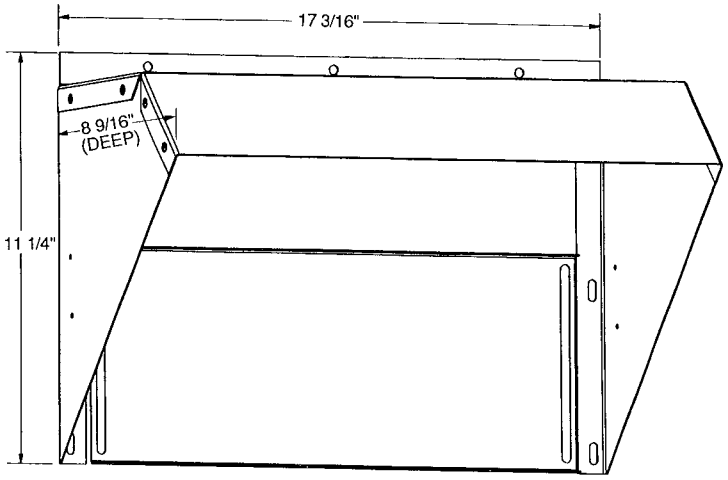
DETAIL "A"



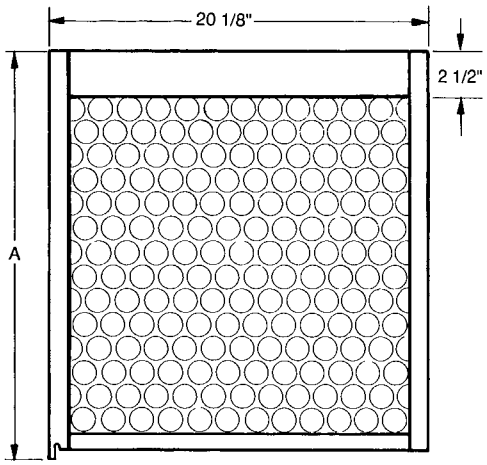
NOTES:
1 Roof curb must be set up for unit being installed
2 Seal strip must be applied as required for unit being installed
3 Dimensions in [ ] are in millimeters
4 Roof curb is made of 16 gage steel
5 Attach ductwork to curb (flanges of duct rest on curb)
6 Service clearance 4 ft on each side
7 ⇨ Direction of airflow
8 Insulated panels: 1-in thick fiberglass 1 lb density

Accessory dimensions (cont)

MANUAL OUTDOOR AIR DAMPER

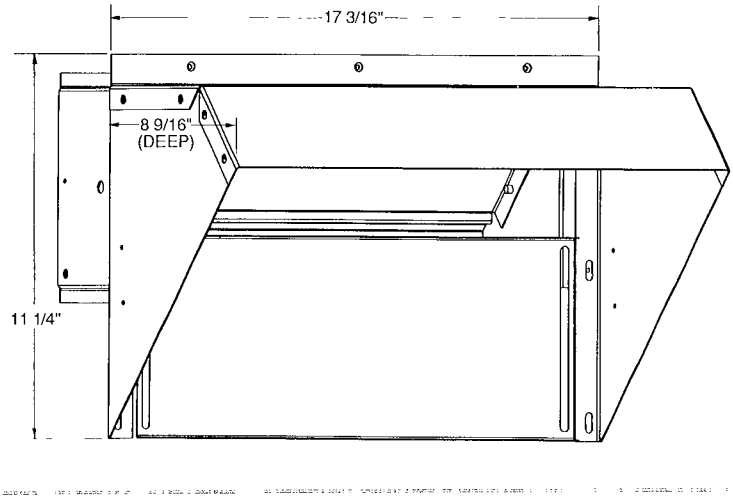


FILTER RACKS AND FILTERS



ACCESSORY	PART NUMBER	"A"
FILTER RACK	50SS500013	21 1/16"
	50SS500040	31 1/16"
	50SS500014	25 1/16"

TWO-POSITION DAMPER



Selection procedure (with example)

I Determine cooling and heating requirements at design conditions:

Given

Required Cooling Capacity (TC)	34,000 Btuh
Sensible Heat Capacity (SHC)	24,000 Btuh
Required Heating Capacity	60,000 Btuh
Condenser Entering-Air Temperature	95 F
Indoor-Air Temperature	80 F edb, 67 F ewb
Evaporator-Air Quantity	1200 cfm
External Static Pressure	0.2 in. wg
Electrical Characteristics (V-Ph-Hz)	208-1-60

II Select unit based on required cooling capacity.

Enter Cooling Capacities table at condenser entering temperature of 95 F Unit 48SS036 at 1200 cfm and 67 F ewb (entering wet bulb) will provide a total capacity of 36,000 Btuh and an SHC of 26,200 Btuh Calculate SHC correction, if required, using Note 4 under Cooling Capacities tables

III Select heating capacity of unit to provide design condition requirement.

In the Heating Capacities and Efficiencies table on page 4, note that unit 48SS036080 will provide 64,800 Btuh with an input of 80,000 Btuh

IV Determine fan speed and power requirements at design conditions.

Before entering the air delivery tables, calculate the total static pressure required From the given, the Wet Coil Pressure Drop table, and the Filter Pressure Drop table on page 18, find at 1200 cfm·

External static pressure	0 20 in wg
Wet coil	0 088 in wg
Filter	0 13 in wg
Total static pressure	0 42 in wg (rounded)

Enter the table for Dry Coil Air Delivery — Horizontal Discharge for 230 and 460 V on page 16 For 208 v operation, deduct 10% from value given. The fan will deliver 1233 cfm at 0 4 external static pressure (1370 x 0.9) at high speed and 852 cfm at 0 5 external static pressure (946 x 0.9) at low speed The fan speed should be set at high to satisfy job requirements

V Select unit that corresponds to power source available.

The Electrical Data table on page 23 shows that the unit is designed to operate at 208-1-60

COOLING CAPACITIES

48SS018

TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		525/0.10			600/0.12			675/0.13		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	15 8	17 4	19 0	16 0	17 6	19 2	16 1	17 8	19 3
	SHC	13 6	11.2	8 7	14 4	11 8	9 0	15 1	12 4	9 2
	kW	1.76	1 80	1 85	1 81	1 86	1 90	1 86	1 91	1 95
95	TC	15 3	16 9	18 5	15.5	17 0	18 7	15 6	17 1	18 8
	SHC	13 4	11 1	8 6	14 2	11 6	8 9	14 9	12 2	9 1
	kW	1 90	1.95	2 00	1 95	2 00	2 05	2 01	2 05	2 10
105	TC	14 6	16 2	17.9	14 9	16 3	18 0	14 9	16.4	18 0
	SHC	13 2	10 9	8 4	14 0	11 4	8 6	14 6	12.0	8 8
	kW	2 05	2 10	2 15	2 10	2 15	2 20	2 15	2 20	2 25
115	TC	13 8	15 5	17 1	14 1	15 6	17.3	14 3	15 7	17 4
	SHC	12 8	10 6	8 1	13 6	11 2	8 4	14 2	11 7	8 7
	kW	2 20	2 26	2 31	2 25	2 31	2 37	2 31	2 36	2 42

48SS024

TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		700/0.06			800/0.07			900/0.08		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	22 5	25 1	27 8	23 0	25 6	28 3	23 4	26.0	28 7
	SHC	19 8	16 6	13 2	21.2	17 6	13 7	22 3	18.6	14.2
	kW	2 51	2 60	2 69	2 56	2 65	2 75	2 62	2 71	2 80
95	TC	21 1	23 6	26 3	21 5	24 0	26 6	21 9	24 4	27 0
	SHC	19 3	16 1	12 7	20 5	17 1	13 1	21 5	18 1	13 7
	kW	2 63	2 73	2 84	2 69	2 82	2 89	2 75	2 85	2 95
105	TC	19 6	22 0	24 6	20 0	22 4	25 0	20 5	22 6	25 3
	SHC	18 5	15 5	12 1	19 7	16 5	12 7	20 5	17 4	13 2
	kW	2 74	2 86	2 97	2 81	2 92	3 03	2 88	2 97	3 09
115	TC	17 9	20 3	22 9	18 6	20 6	23 2	19 2	20 9	23 5
	SHC	17 6	14 9	11 6	18 5	15 9	12 2	19 2	16 9	12 7
	kW	2 85	2 97	3 10	2 93	3 03	3 16	3 01	3 09	3 21

48SS030

TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		875/0.08			1000/0.09			1125/0.10		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	27 5	30 7	33 7	28 0	31 1	34 0	28 4	31 3	34 5
	SHC	25 2	21 0	16 3	26 8	22 3	16 9	28 2	23 4	17 6
	kW	3 01	3 09	3 16	3 07	3 15	3 22	3 13	3 20	3 28
95	TC	25 8	28 8	31 7	26 3	29 2	32 3	26 9	29 4	32 4
	SHC	24 4	20 4	15 6	25 9	21 6	16 4	26 9	22 7	16 9
	kW	3.16	3 25	3 33	3 23	3 32	3 40	3 30	3 37	3 44
105	TC	23 9	26 9	29 9	24 6	27 2	30 1	25 3	27 5	30 5
	SHC	23 4	19 6	15 0	24 6	20 9	15 6	25 3	22 1	16 4
	kW	3 30	3 40	3 49	3 38	3 46	3 54	3 45	3 52	3 61
115	TC	21 9	24 8	27 6	22 9	25 0	28 0	23 6	25 2	28 1
	SHC	21 9	18 8	14 2	22 9	20 1	15 0	23 6	21 2	15 6
	kW	3 44	3 53	3 62	3 52	3.59	3 89	3 59	3 64	3 74

48SS036

TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		1050/0.07			1200/0.08			1350/0.09		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	33 6	37 6	41 7	34 2	38 3	42 3	34 8	38.7	42.6
	SHC	30 5	25 4	19 9	32 5	27 1	20 7	34.2	28.5	21.4
	kW	3 72	3 86	3 99	3 81	3 95	4 08	3 90	4.03	4.15
95	TC	31 2	35 5	39 3	31 9	36 0	40 2	32 8	36 4	40 4
	SHC	29 4	24 7	19 1	31 4	26 2	20 1	32 8	27 7	20 8
	kW	3.90	4.05	4 18	3 99	4.14	4 29	4 09	4 22	4 36
105	TC	28 8	33 2	37 2	30.0	33 7	37 6	31 1	34 0	37.9
	SHC	28 2	23 8	18 4	30.0	25 4	19 2	31 0	26 8	20 0
	kW	4 08	4 23	4 39	4 17	4 32	4 48	4 29	4 41	4 56
115	TC	26.7	30.9	34 7	28 1	31 3	35 0	29 2	31 6	35 2
	SHC	26.7	22.9	17 5	28 1	24.5	18 3	29.2	25 9	19 0
	kW	4 26	4 41	4 57	4 37	4 50	4.66	4 48	4 58	4 73

48SS042

TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		1225/0.11			1400/0.12			1575/0.14		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	40 3	44 2	47 9	41 1	44 9	48 5	41 8	45 4	49 0
	SHC	36 1	30 0	23 5	38 3	31 7	24 3	40 2	33 2	25 0
	kW	4 28	4 43	4 57	4 38	4 52	4 66	4 48	4 61	4 75
95	TC	38 0	41.8	45 3	38 8	42 5	45 9	39 4	43 0	46 4
	SHC	34 9	29 2	22 5	37 1	30 9	23 4	38 9	32.5	24 2
	kW	4 50	4 67	4 81	4 61	4 77	4 91	4 71	4 87	5 00
105	TC	35 7	39 3	43 0	36.4	39 9	43 3	37 2	40.4	43 7
	SHC	33 8	28 2	21 8	35.8	29 9	22 5	37 2	31 5	23.4
	kW	4 73	4 90	5 08	4 84	5 01	5 17	4.94	5 10	5.26
115	TC	33 3	36 7	40 1	34 1	37 2	40 4	35 0	37 6	40 8
	SHC	32 5	27 2	20 7	34 1	28 8	21 4	35.0	30 4	22 3
	kW	4 94	5 12	5 30	5 06	5 23	5 39	5 18	5 32	5 49

LEGEND

BF — Bypass Factor
Ewb — Entering Wet-Bulb
kW — Total Unit Power Input
SHC — Sensible Heat Capacity, 1000 Btuh
TC — Total Cooling Capacity, 1000 Btuh (net)

NOTES

1 Ratings are net, they account for the effects of the indoor-fan motor power and heat.
2 Direct interpolation is permissible Do not extrapolate
3 The following formulas may be used

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1\ 10 \times \text{cfm}}$$

t_{lwb} = Wet-bulb temperature corresponding to enthalpy of air leaving indoor coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4\ 5 \times \text{cfm}}$$

Where h_{ewb} = Enthalpy of air entering indoor coil

4 The SHC is based on 80 F edb temperature of air entering indoor coil
Below 80 F edb, subtract (corr factor x cfm) from SHC
Above 80 F edb, add (corr factor x cfm) to SHC
Correction Factor = 1 10 x (1 – BF) x (edb – 80)

COOLING CAPACITIES (cont)

48SS048

TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		1400/0.08			1600/0.10			1800/0.11		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	43 8	48 3	52 9	44 5	49 1	53 7	45 1	49 6	53 9
	SHC	39 4	32 7	25 6	41 9	34 6	26 4	44 1	36 4	27 1
	kW	4 76	4 85	4 95	4 87	4 97	5 07	4 99	5 08	5 17
95	TC	41 9	46 4	50 9	42 6	47 0	51 7	43 3	47 5	52 2
	SHC	38 6	32 1	24 8	41 1	33 9	25 9	43 1	35 9	26 8
	kW	5 17	5 28	5 38	5 29	5 40	5 50	5 41	5 51	5 61
105	TC	39 3	44 2	48 8	40 1	44 7	49 2	41 2	45 2	49 6
	SHC	37 3	31 2	24 1	39 7	33 1	25 1	41 2	35 1	26 0
	kW	5 61	5 73	5.83	5 74	5 85	5.95	5 87	5 96	6 06
115	TC	36 6	41 5	46 4	37 7	42 4	47 0	39 0	42 8	47 4
	SHC	35 9	30 2	23 4	37 6	32 4	24 3	39 0	34 2	25 4
	kW	6 08	6 22	6.34	6 22	6 34	6 45	6 36	6 46	6 57

48SS060

TEMP (F) AIR ENT COND		EVAP AIR — CFM/BF								
		1750/0.03			2000/0.04			2250/0.05		
		Evap Air — Ewb (F)								
		62	67	72	62	67	72	62	67	72
85	TC	55 0	62 0	69 4	56 3	63 1	70 5	58 2	63 9	71 3
	SHC	52 4	43 7	34 2	56 1	46 7	35 8	58 1	49 5	37 4
	kW	6 14	6 33	6 53	6 32	6 50	6 70	6 52	6 67	6 88
95	TC	51 8	58 8	66 2	53 6	59 6	67 3	55 6	60 2	68 1
	SHC	51 0	42 4	33 2	53 5	45 3	34 8	55 6	48 2	36 3
	kW	6 62	6 82	7 05	6 83	7 00	7 22	7 03	7 17	7 39
105	TC	48 7	55 1	62 9	51 0	56 0	63 9	53 0	56 7	64 5
	SHC	48 7	41 1	32 1	50 9	44 0	33 7	52 8	46 9	35 3
	kW	7 17	7 37	7 60	7 39	7 54	7.78	7.59	7 71	7 95
115	TC	45 8	52 0	59 5	48 5	52 8	60 5	50 4	53 4	60 8
	SHC	45 8	40 0	30 9	48 4	42 8	32 6	50 3	45 6	34 1
	kW	7 77	7 94	8 19	7.98	8 12	8 36	8 18	8 29	8 43

LEGEND

BF — Bypass Factor
Ewb — Entering Wet-Bulb
kW — Total Unit Power Input
SHC — Sensible Heat Capacity, 1000 Btuh
TC — Total Cooling Capacity, 1000 Btuh (net)

NOTES

1 Ratings are net, they account for the effects of the indoor-fan motor power and heat.
2 Direct interpolation is permissible Do not extrapolate
3. The following formulas may be used.

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1\ 10 \times \text{cfm}}$$

t_{lwb} = Wet-bulb temperature corresponding to enthalpy of air leaving indoor coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4\ 5 \times \text{cfm}}$$

Where h_{ewb} = Enthalpy of air entering indoor coil

4 The SHC is based on 80 F edb temperature of air entering indoor coil
Below 80 F edb, subtract (corr factor x cfm) from SHC
Above 80 F edb, add (corr factor x cfm) to SHC
Correction Factor = 1 10 x (1 – BF) x (edb – 80)

DRY COIL AIR DELIVERY* — HORIZONTAL DISCHARGE
(Deduct 10% for 208 v)

UNIT SIZE 48SS	MOTOR SPEED		230 AND 460 VOLT HORIZONTAL DISCHARGE External Static Pressure (in. wg)										
			0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
018	Low	Watts	230	225	220	210	195	170	—	—	—	—	—
		Cfm	760	745	725	695	640	540	—	—	—	—	—
	High	Watts	—	—	—	—	270	235	200	—	—	—	—
		Cfm	—	—	—	—	850	700	450	—	—	—	—
024, 030	Low	Watts	275	275	273	269	260	257	249	—	—	—	—
		Cfm	857	835	802	782	745	717	663	—	—	—	—
	Med	Watts	371	368	360	349	345	326	319	304	293	—	—
		Cfm	1079	1063	1027	996	978	919	865	783	726	—	—
	High	Watts	514	493	476	460	443	425	401	378	344	—	—
		Cfm	1409	1383	1324	1282	1223	1156	1068	984	857	—	—
036	Low	Watts	473	447	427	418	395	367	346	337	323	—	—
		Cfm	1253	1253	1172	1130	1047	946	865	829	768	—	—
	Med	Watts	519	500	478	459	439	410	377	357	340	—	—
		Cfm	1414	1366	1287	1234	1162	1074	920	829	743	—	—
	High	Watts	667	634	609	593	564	541	506	469	436	422	—
		Cfm	1734	1639	1563	1461	1370	1292	1157	960	829	743	—
042	Low	Watts	678	635	604	580	550	520	493	455	430	—	—
		Cfm	1540	1515	1475	1430	1375	1280	1225	1128	1020	—	—
	High	Watts	—	820	785	750	700	680	649	612	570	—	—
		Cfm	—	1825	1750	1685	1610	1525	1485	1335	1215	—	—
048	Low	Watts	—	—	854	786	744	706	641	606	557	511	—
		Cfm	—	—	2026	1905	1830	1752	1603	1513	1367	1228	—
	High	Watts	—	—	—	905	846	824	804	748	683	637	—
		Cfm	—	—	—	2025	1905	1830	1752	1603	1398	1228	—
060	Low	Watts	1000	991	970	925	904	875	849	830	819	—	—
		Cfm	2125	2110	2085	2046	2009	1960	1900	1845	1775	—	—
	Med	Watts	1355	1315	1265	1212	1158	1103	987	925	880	—	—
		Cfm	2480	2440	2388	2336	2266	2198	2050	1968	1890	—	—
	High	Watts	—	—	1435	1375	1310	1265	1175	1108	1010	915	—
		Cfm	—	—	2509	2450	2380	2310	2235	2160	2083	1888	—

*Air delivery values are based on operating voltage of 230 v or 460 v, dry coil, without filter
Deduct wet coil and filter pressure drops to obtain external static pressure available for ducting

NOTES
1 Do not operate the unit at a cooling airflow that is less than 350 cfm for each 12,000 Btuh of rated cooling capacity Evaporator coil frosting may occur at airflows below this point.
2 Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended

DRY COIL AIR DELIVERY* — VERTICAL DISCHARGE
(Deduct 10% for 208 v)

UNIT SIZE 48SS	MOTOR SPEED		230 AND 460 VOLT VERTICAL DISCHARGE External Static Pressure (in. wg)										
			0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
018	Low	Watts	—	295	251	223	201	176	149	124	—	—	—
		Cfm	—	821	817	753	665	536	343	164	—	—	—
	High	Watts	401	376	346	322	294	272	250	229	219	—	—
		Cfm	1334	1253	1128	996	816	658	461	246	167	—	—
024, 030	Low	Watts	—	285	284	282	278	274	270	261	251	244	230
		Cfm	—	798	761	727	682	634	581	525	450	371	304
	Med	Watts	—	378	371	368	362	357	343	332	315	301	283
		Cfm	—	1011	982	948	906	858	771	703	597	492	387
	High	Watts	—	520	511	487	472	451	431	411	385	362	341
		Cfm	—	1342	1289	1237	1181	1106	1007	892	745	610	471
036	Low	Watts	—	460	439	423	898	379	349	322	297	270	246
		Cfm	—	1191	1136	1081	1005	907	795	687	579	471	349
	Med	Watts	—	511	492	470	450	420	392	364	332	308	275
		Cfm	—	1316	1244	1178	1104	1005	891	784	657	535	389
	High	Watts	—	655	631	603	584	552	522	492	459	433	398
		Cfm	—	1541	1458	1367	1292	1178	1053	920	806	662	509
042	Low	Watts	—	637	612	587	560	536	493	455	—	—	—
		Cfm	—	1500	1450	1405	1350	1290	1200	1105	—	—	—
	High	Watts	—	790	750	700	699	639	608	574	547	—	—
		Cfm	—	1750	1625	1604	1509	1421	1323	1221	1094	—	—
048	Low	Watts	—	847	784	746	708	646	609	563	516	—	—
		Cfm	—	1995	1901	1822	1730	1580	1477	1319	1178	—	—
	High	Watts	—	—	909	852	820	801	751	687	639	—	—
		Cfm	—	—	2018	1896	1814	1729	1582	1380	1220	—	—
060	Low	Watts	—	970	952	928	905	880	847	804	760	—	—
		Cfm	—	2075	2054	2024	1994	1945	1890	1830	1762	—	—
	Med	Watts	—	—	1291	1247	1195	1076	1025	970	921	833	810
		Cfm	—	—	2395	2348	2291	2164	2099	2022	1950	1827	1804
	High	Watts	—	1490	1400	1312	1270	1219	1161	1104	1045	985	930
		Cfm	—	2530	2475	2420	2355	2289	2223	2150	2079	2008	1932

*Air delivery values are based on operating voltage of 230 v or 460 v, dry coil, without filter
Deduct wet coil and filter pressure drops to obtain external static pressure available for ducting

NOTES
1 Do not operate the unit at a cooling airflow that is less than 350 cfm for each 12,000 Btuh of rated cooling capacity Evaporator coil frosting may occur at airflows below this point
2 Dashes indicate portions of table that are beyond the blower motor capacity or are not recommended

Performance data (cont)

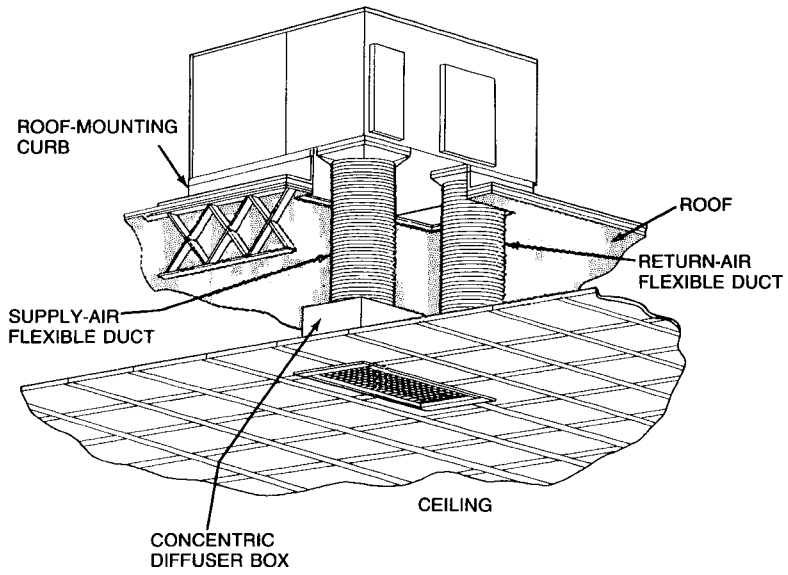
WET COIL PRESSURE DROP

UNIT SIZE	AIRFLOW (cfm)	PRESSURE DROP (in. wg)
018	600	0.069
	700	0.082
	800	0.102
	900	0.116
024	600	0.039
	700	0.058
	800	0.075
	900	0.088
030	900	0.088
	1000	0.095
	1200	0.123
036	1000	0.068
	1200	0.088
	1400	0.108
	1600	0.123
042	1000	0.048
	1200	0.069
	1400	0.088
	1600	0.102
048	1400	0.068
	1600	0.075
	1800	0.088
060	1700	0.082
	1900	0.095
	2100	0.108
	2300	0.123

FILTER PRESSURE DROP (in. wg)

UNIT SIZE	FILTER SIZE (in.)	CFM																		
		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
018, 024	20 x 20	0.05	0.07	0.08	0.10	0.12	0.13	—	—	—	—	—	—	—	—	—	—	—	—	—
030, 036	20 x 24	—	—	—	—	0.09	0.10	0.11	0.13	0.14	0.15	0.16	—	—	—	—	—	—	—	—
042	24 x 24	—	—	—	—	—	—	—	—	0.11	0.12	0.14	0.15	—	—	—	—	—	—	—
048, 060	24 x 30	—	—	—	—	—	—	—	—	—	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18

Typical installation



Application data

Condensate trap — A 2-in condensate trap must be field supplied.

Ductwork — Secure downflow discharge ductwork to roof curb For horizontal discharge applications, attach ductwork to unit with flanges

To convert a unit to downflow discharge or horizontal discharge — Units are equipped with factory-installed duct covers on both the downflow and horizontal openings Remove appropriate duct panel covers for intended discharge application Units with downflow option do not require duct panel cover removal

Thermostat — To achieve simultaneous economizer cooling and mechanical cooling, use of 2-stage cooling thermostat is recommended for all units equipped with an accessory economizer

Airflow — Units are draw-thru on cooling and blow-thru on heating

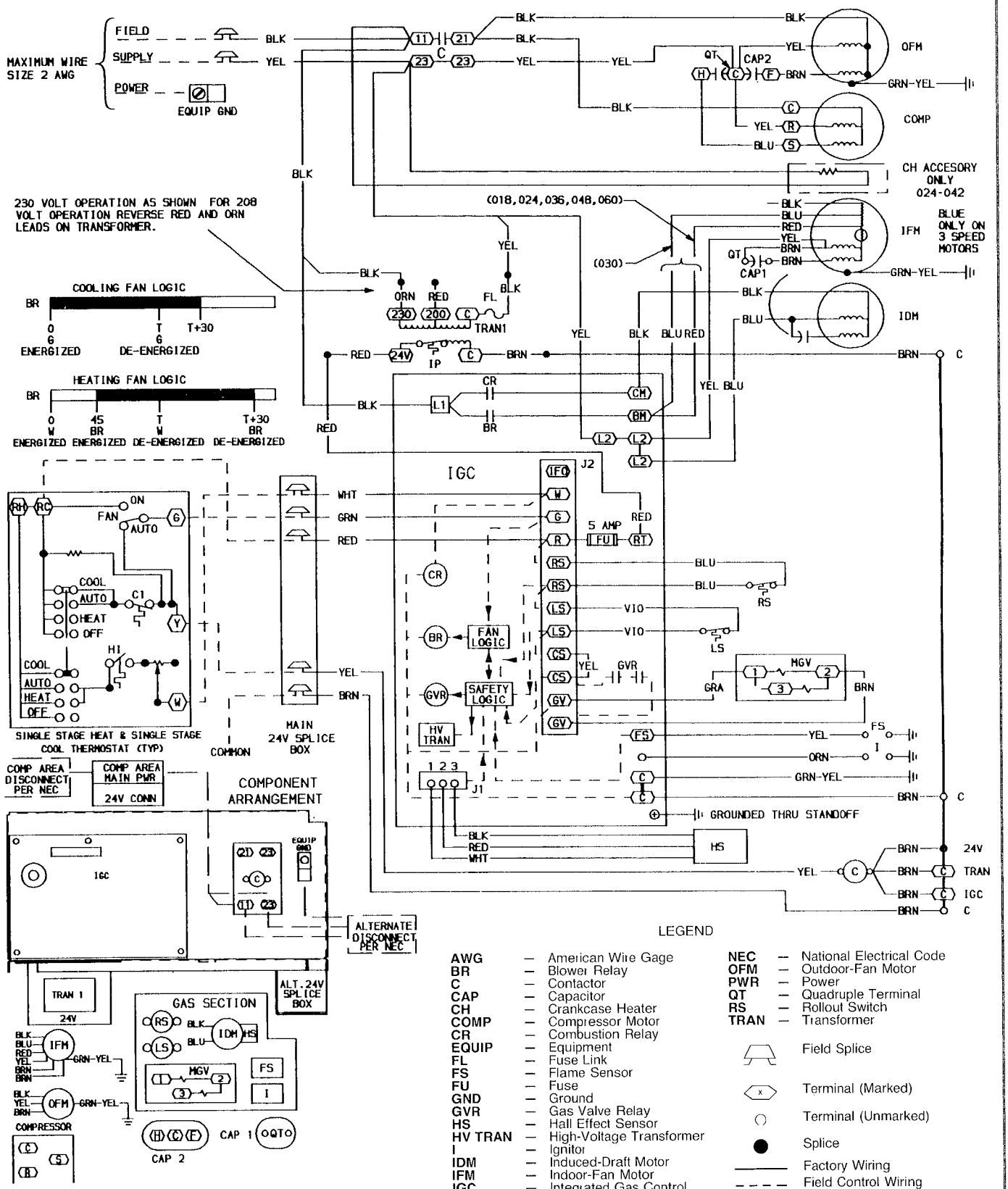
Maximum cooling airflow — To minimize the possibility of condensate blow-off from evaporator, airflow through units should not exceed 450 cfm/ton

Minimum cooling airflow is 350 cfm/ton

Minimum ambient operating temperature for all standard units is 40 F. With accessory low ambient temperature kit, units can operate at temperatures down to 0° F

Typical control wiring schematic

208/230-1-60



LEGEND

AWG	—	American Wire Gage
BR	—	Blower Relay
C	—	Contactor
CAP	—	Capacitor
CH	—	Crankcase Heater
COMP	—	Compressor Motor
CR	—	Combustion Relay
EQUIP	—	Equipment
FL	—	Fuse Link
FS	—	Flame Sensor
FU	—	Fuse
GND	—	Ground
GVR	—	Gas Valve Relay
HS	—	Hall Effect Sensor
HV TRAN	—	High-Voltage Transformer
I	—	Ignitor
IDM	—	Induced-Draft Motor
IFM	—	Indoor-Fan Motor
IGC	—	Integrated Gas Control
IP	—	Internal Protector
LS	—	Limit Switch
MGV	—	Main Gas Valve
NEC	—	National Electrical Code
OFM	—	Outdoor-Fan Motor
PWR	—	Power
QT	—	Quadruple Terminal
RS	—	Rollout Switch
TRAN	—	Transformer

Field Splice

Terminal (Marked)

Terminal (Unmarked)

Splice

Factory Wiring

Field Control Wiring

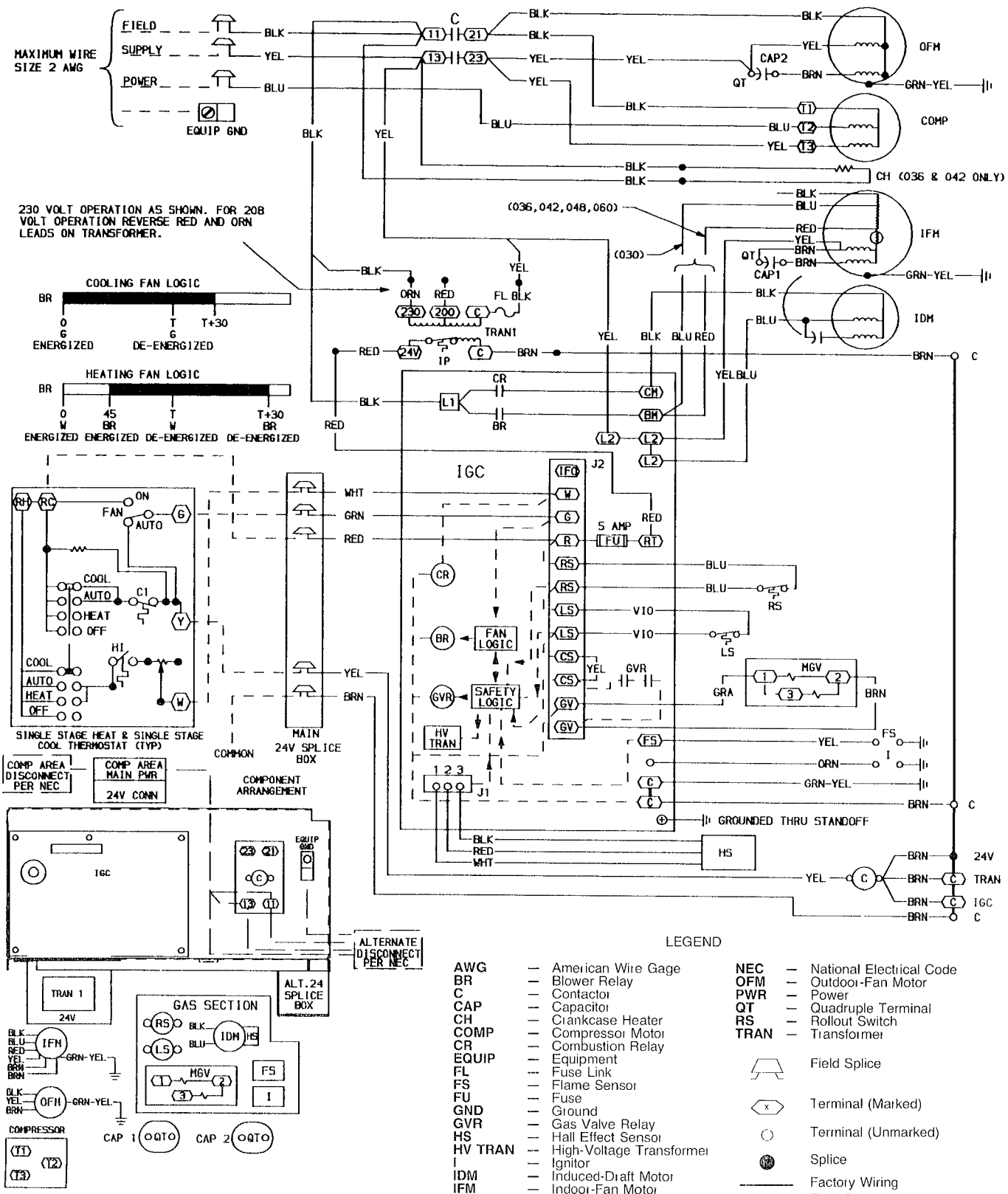
Field Power Wiring

Accessory or Optional Wiring

To Indicate Common Potential Only, Not to Represent Wiring

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Thermostat: HH07AT174, HH01AD040, HH01AD046, HH01PC184, HH018C185 Subbase: HH93AZ040, HH93AZ176
3. Use copper conductors only

208/230-3-60



LEGEND

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MGV	—	Main Gas Valve
NEC	—	National Electrical Code
OFM	—	Outdoor-Fan Motor
PWR	—	Power
QT	—	Quadruple Terminal
RS	—	Rollout Switch
TRAN	—	Transformer

Field Splice

Terminal (Marked)

Terminal (Unmarked)

Splice

Factory Wiring

Field Control Wiring

Field Power Wiring

Accessory or Optional Wiring

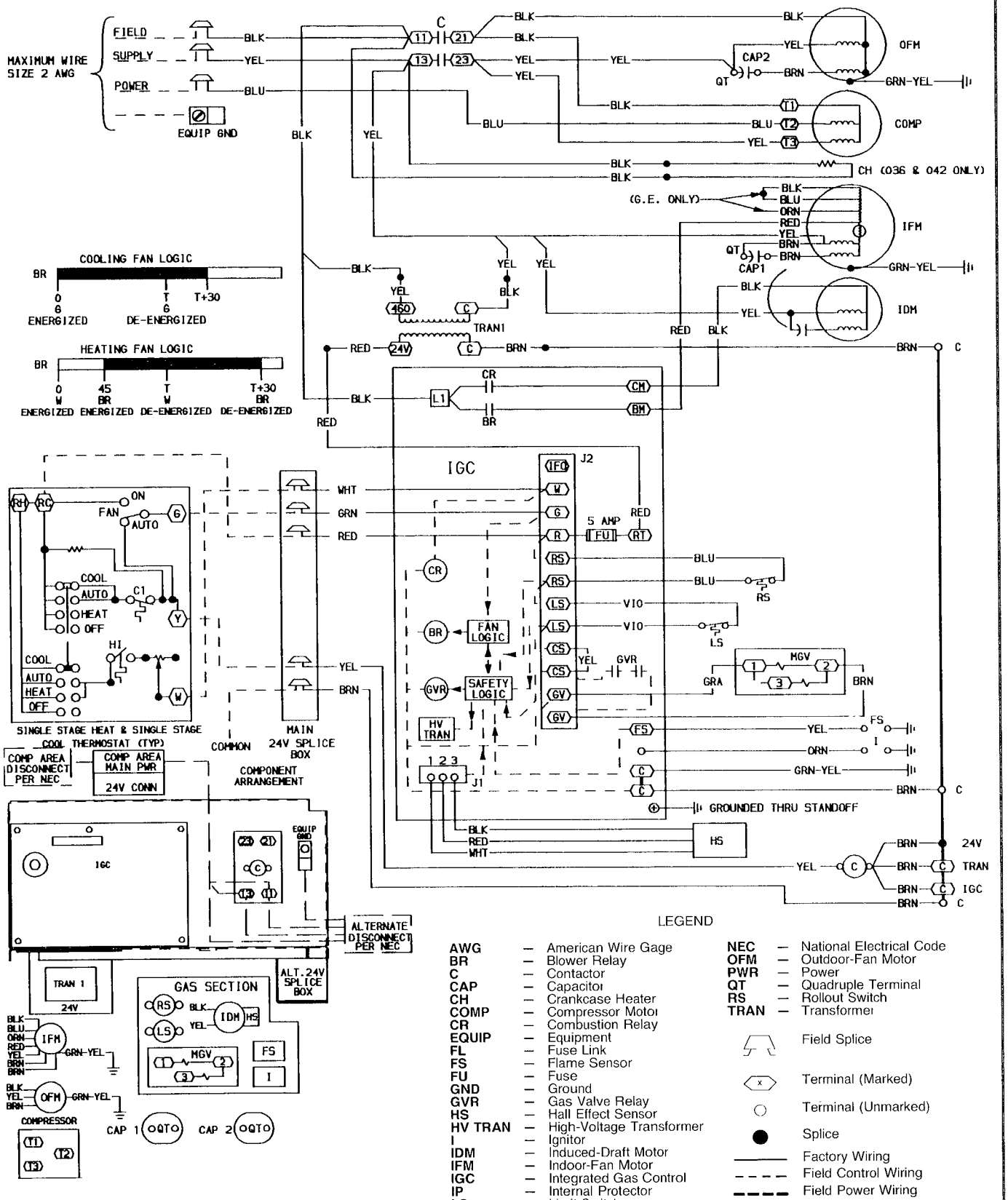
To Indicate Common Potential Only, Not to Represent Wiring

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Thermostat: HH07AT174, HH01AD040, HH01AD046, HH01PC184, HH01PC185 Subbase: HH93AZ040, HH93AZ176
3. Use copper conductors only

Typical control wiring schematic (cont)

Carrier®

460-3-60



LEGEND

AWG	—	American Wire Gage
BR	—	Blower Relay
C	—	Contactor
CAP	—	Capacitor
CH	—	Crankcase Heater
COMP	—	Compressor Motor
CR	—	Combustion Relay
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IDM	—	Induced-Draft Motor
IFM	—	Indoor-Fan Motor
IGC	—	Integrated Gas Control
IP	—	Internal Protector
LS	—	Limit Switch
MGV	—	Main Gas Valve
NEC	—	National Electrical Code
OFM	—	Outdoor-Fan Motor
PWR	—	Power
QT	—	Quadruple Terminal
RS	—	Rollout Switch
TRAN	—	Transformer

Field Splice

Terminal (Marked)

Terminal (Unmarked)

Splice

Factory Wiring

Field Control Wiring

Field Power Wiring

Accessory or Optional Wiring

To Indicate Common Potential Only, Not to Represent Wiring

NOTES:
1 If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2 Thermostat: HH07AT174, HH01AD040, HH01AD046, HH01PC184, HH01PC185 Subbase: HH93AZ040, HH93AZ176
3 Use copper conductors only

UNIT 48SS	V-PH-HZ	VOLTAGE RANGE		COMPRESSOR		COND. FAN MOTOR	INDOOR FAN FLA	POWER SUPPLY		AWG 60 C MIN WIRE SIZE†	MAX WIRE LENGTH (ft)
		Min	Max	RLA	LRA	FLA		MCA	MOCP*		
018	208/230-1-60	187	253	7 6	45	0 7	1 8	12 0	15	14	75
024				12 4	61	0 7	2 0	18 2	30	12	80
030				14 4	82	1 4	2 0	21 8	30	10	100
036				18 0	96	1 4	2 8	26 7	40	10	90
042				20 4	104	1 4	4 0	30 9	50	8	100
048				26 4	129	2 1	5 0	40 1	60	6	100
060				32 1	169	2 1	6 8	49 0	60	6	100
030	208/230-3-60	187	253	9 4	66	1 4	2 0	15 5	25	12	80
036				11 7	75	1 4	2 8	18 8	30	12	65
042				14 0	91	1 4	4 0	22 9	35	10	85
048				15 0	99	2 1	5 0	25 9	40	10	75
060				19 3	123	2 1	6 8	33 0	50	8	90
036	460-3-60	414	506	5 6	40	0 8	1 4	9 2	10	14	100
042				6 4	42	0 8	2 0	10 8	15	14	100
048				8 2	50	1 1	2 3	13 7	20	14	100
060				10 0	62	1 1	3 2	16 8	25	12	100

LEGEND

AWG — American Wire Gage
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
RLA — Rated Load Amps

*Fuse or HACR breaker
†Minimum wire size is based on 60 C copper wire If other than 60 C wire is used, determine size from NEC Voltage drop of wire must be less than 2% of rated voltage

NOTES:

1 In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker The CSA units may be fuse or circuit breaker

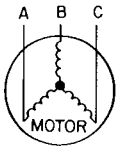
2 **Unbalanced 3-Phase Supply Voltage**

Never operate a motor where a phase imbalance in supply voltage is greater than 2% Use the following formula to determine the percent voltage imbalance

% Voltage Imbalance

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example Supply voltage is 460-3-60



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage
(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v
Maximum deviation is 7 v

Determine percent voltage imbalance

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457}$$

$$= 1\ 53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately

Heating

On a call for heating, terminal "W" of the thermostat is energized, starting the induced-draft motor When the hall-effect sensor on the induced-draft motor senses that it has reached the required speed, the burner sequence begins. This function is performed by the integrated control board (IGC). The indoor-fan motor is energized 45 seconds after flame is established When the thermostat is satisfied and "W" is deenergized, the indoor-fan motor stops after a 45-second time-off delay

Cooling

With the room thermostat SYSTEM switch in the COOL position and the FAN switch in the AUTO position, the cooling sequence of operation is as follows

When the room temperature rises to a point that is slightly above the cooling control setting of the thermostat, the thermostat completes the circuit between thermostat terminal R to terminals Y and G. These completed circuits through the thermostat connect contactor coil (C) (through unit wire Y) and blower relay coil (BR) (through unit wire G) across the 24-v secondary of transformer (TRAN).

The normally-open contacts of energized contactor (C) close and complete the circuit through compressor motor (COMP) to condenser (outdoor) fan motor (OFM) Both motors start instantly

The set of normally-open contacts of energized relay BR close and complete the circuit through evaporator blower (indoor) fan motor (IFM). The blower motor starts instantly

NOTE. Once the compressor has started and then has stopped, it should not be started again until 5 minutes have elapsed

The cooling cycle remains "on" until the room temperature drops to point that is slightly below the cooling control setting of the room thermostat. At this point, the thermostat "breaks" the circuit between thermostat terminal R to terminals Y and G These open circuits deenergize contactor coil C and relay coil BR The condenser and compressor motors stop After a 30-second delay, the blower motor stops The unit is in a "standby" condition, waiting for the next "call for cooling" from the room thermostat.

Packaged Heating/Cooling Units Constant Volume Application

HVAC Guide Specifications

Size Range: **1½ to 5 Tons, Nominal Cooling 40,000 to 140,000 Btuh, Nominal Input Heating**

Carrier Model Number **48SS**

Part 1 — General

1 01 SYSTEM DESCRIPTION

A Outdoor rooftop mounted, gas heating/electric cooling unit utilizing a rotary, reciprocating, or scroll hermetic compressor for cooling duty Unit shall discharge supply air downward or horizontally as shown on contract drawings Outdoor fan/coil section shall have a blow-thru design for minimum sound levels.

1 02 QUALITY ASSURANCE

A Unit shall be rated in accordance with ARI Standards 210/240-89 and 270-84

B Unit shall be designed in accordance with UL Standard 564.

C Unit shall be UL listed and CSA certified as a total package for safety requirements

D Roof curb shall be designed to conform to NRCA Standards

E Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation

F Cabinet insulation shall meet ASHRE standard no 62P

1 03 DELIVERY, STORAGE, AND HANDLING

A Unit shall be stored and handled per manufacturer's recommendations

Part 2 — Products

2 01 EQUIPMENT

A General

Factory-assembled, single-piece heating and cooling unit Contained within the enclosure shall be all factory wiring, piping, controls, refrigerant charge (R-22), and special features required prior to field start-up

B Unit Cabinet·

1 Unit cabinet shall be constructed of phosphated, zinc-coated prepainted steel, capable of withstanding 500 hours in salt spray

2 Cabinet panels shall be easily removed for servicing

3 Indoor blower compartment interior cabinet surfaces shall be insulated with a minimum ½-in. thick, flexible fiberglass insulation, coated on the air side. Aluminum foil-faced fiberglass insulation shall be used in the entire section

C. Fans.

1 The indoor (evaporator) fan shall be 2- or 3-speed direct-drive, as shown on equipment drawings

2 Fan wheel shall be made from steel, be double-inlet type with forward curved blades with corrosion resistant finish and be dynamically balanced.

3 Outdoor (condenser) fan shall be of the direct driven, propeller type with aluminum blades riveted to corrosion resistant steel spiders, be dynamically balanced, and discharge air vertically upwards and horizontally

D Compressor:

1 Fully hermetic compressor with factory-installed vibration isolation

2 Rotary compressors shall be standard on unit size 018 Reciprocating compressors shall be standard on unit sizes 024-042 Scroll compressors shall be standard on unit sizes 048 and 060.

E Coils

Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed Tube sheet openings shall be belled to prevent tube wear.

F Heating Section.

1 Induced-draft combustion type with energy saving direct spark ignition system and redundant main gas valve

2. Induced-draft motors shall be provided with solid-state hall effects sensor to ensure adequate airflow for combustion

3 The heat exchangers shall be constructed of aluminized steel for corrosion resistance

4 Burners shall be of the in-shot type constructed of aluminum coated steel

5 Integrated gas control board shall provide control of heating and simplify troubleshooting through its built-in diagnostic function.

6. All gas piping and electric power shall enter the unit cabinet at a single location

G. Refrigerant Components·

Refrigerant components shall be of the Acutrol™ feed system type

H. Filter section shall consist of field-installed, throw-away, 1-in. thick fiberglass filters of commercially available sizes

I. Controls and Safeties

1 Unit Controls.

a Unit shall be complete with self-contained low-voltage control circuit.

2 Safeties.

Compressors shall incorporate a solid-state compressor protector which provides reset capability

J Operating Characteristics

1 Unit shall be capable of starting and running at 125 F ambient outdoor temperature per maximum load criteria of ARI Standard 210/240-89.

2. Compressor with standard controls shall be capable of operation down to 40 F ambient outdoor temperature.

3. Unit provided with fan time delay to prevent cold air delivery before heat exchanger warms up

4. Unit provided with fan time-delay after the thermostat is satisfied.

K. Electrical Requirements

All unit power wiring shall enter unit cabinet at a single location

L. Motors

1 Compressor motors shall be of the refrigerant-cooled type with line break thermal and current overload protection

2 All fan motors shall have permanently lubricated-bearings, and inherent automatic reset thermal overload protection

3 Condenser-fan motor shall be totally enclosed

M Special Features·

1. Economizer

a. Economizer controls capable of providing free cooling using outside air

b Equipped with low-leakage dampers not to exceed 3% leakage, at 1.0 in wg pressure differential.

c Spring-return motor shuts off outdoor damper on power failure

2 Roof Curb

Curb shall have seal strip and a wood nailer for flashing and shall be installed per manufacturer's instructions

3 Manual Outdoor-Air Damper

Manual damper package shall consist of damper, birdscreen, and rainhood which can be preset to admit outdoor air for year-round ventilation

4. Two-Position Damper

Damper allows outside air to enter the building when the indoor fan is energized

5 Thermostat and Subbase

To provide for one-stage heating and cooling in addition to manual or automatic changeover and fan control

6. Electronic Programmable Thermostat:

Thermostat provides 2-stage heating and 2-stage cooling control with remote communication ability.

7. Natural-to-Propane Conversion Kit

Kit shall have burner orifices

8 Low Ambient Package:

Package shall consist of a solid-state control and condenser coil temperature sensor for controlling outdoor-fan motor operation, which shall allow unit to operate down to 0° F outdoor ambient temperature.

9. Time Guard® Device

Solid-state control shall protect compressor by preventing short cycling

10 Flexible Duct Kit

Kit shall include 2 flexible UL-listed ducts The duct is insulated with 1-in fiberglass insulation and includes a vapor barrier.

11 Concentric Diffuser Box

To provide even 4-way air distribution. Designed for use with accessory flexible ducts and roof curbs

12 Lifting Bracket Kit.

Kit shall provide attachment points for rigging straps (Not required with optional base rail or downflow option applications)

13 High- and Low-Pressure Switch Kits

Switches provide additional safety features and protect the unit from running at unsuitable pressures

14 Filter Rack·

Rack provides mounting location for filters when unit is in downflow application

15. Crankcase Heater

Heater warms crankcase oil to reduce refrigerant migration (recommended on 208/230-v, single-phase units in sizes 024-042)

16 Base Rail

Base rail provides holes for rigging and handling, and an elevated base for horizontal applications

17 Downflow Option

Option provides for vertical ductwork connections